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SARPY BASIN WILDLIFE ECOLOGY STUDY

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JUNE 1976

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INTRODUCTION

With a renegotiated contract for coal extraction and newly acquired surface rights, the Westmoreland mining operation in the upper portion of the Sarpy Creek drainage is proceeding into its third year of production. Montana Power Company began construction of its Colstrip to Broadview 230 kilovolt transmission powerline crossing the Sarpy drainage from east to west approximately 21 miles south of Interstate Highway 94. Treasure County and the Montana Highway Department plan a substantial amount of work on the Sarpy Creek road and other roads in the area in the near future. The railroad spur, constructed up Sarpy Creek solely to provide an outlet for coal, will be maintained and upgraded. Amax Coal Company and Consolidation Coal Company, which hold substantial coal leases in the drainage, have expressed a strong desire to develop their holdings. Westmoreland has been exploring the possibility of opening a new mine west of Sarpy Creek. Western Energy Company, a subsidiary of Montana Power, also owns coal leases in the area which it could develop.

All of the activities mentioned above, together with the implicit human factor and other energy-related developments which may become evident in the near future, firmly establish and confirm the need for this study. The continuing objectives of this study are:

(1) To determine the impact of existing and future surface mining operations on wildlife resources in the area.

(2) To ensure that fish and wildlife habitat values receive full recognition in any surface reclamation efforts that follow surface mining operations.

(3) To investigate possible modifications, additions or innovations in the surface mining reclamation processes to avoid unnecessary loss of wildlife habitat and develop techniques and procedures to enhance habitat through reclamation.

PROCEDURES

The primary objective during the first year of study (Martin 1975) was to become familiar with all physical aspects of the area including vegetational composition, soil types and existing wildlife populations. The history of several wildlife species and present population characteristics were documented. The primary goal of the second year was to obtain a solid foundation of population characteristics for the primary species during all seasons against which future observations could be compared and conclusions made with acceptable reliability.

Observations of wildlife were made during low-level fixed-wing aerial flights. The entire study area was covered once each season. A north-south flight following section lines at 1-mile intervals was used

for the winter (December 1974 - February 1975), spring (March 1975 - May 1975) and summer (June 1975 - August 1975) flights. During the fall (September 1975 - November 1975) flight a 1/2-mile interval between flight lines produced a more thorough coverage resulting in a substantially higher number of observations. Observations made during vehicular surveys were also recorded. At each observation the vegetation type being used, the activity, the type of terrain, the slope and exposure, the time of day and the location to the nearest quarter section were recorded.

All area measurements were obtained with a digitized planimeter located in the C.E. & E.M. Department, Montana State University, Bozeman.

STUDY AREA

Location

The Sarpy Creek study area (Figure 1) is located in southeastern Montana south of the Yellowstone River and east of the Bighorn River. Sarpy Creek flows approximately 70 miles from its headwaters in Bighorn County north through Treasure County to its confluence with the Yellowstone River east of Hysham, Montana. There are approximately 506.3 square miles (Table 1) in the area with 62 percent in Treasure County, 35 percent in Big Horn County and 3 percent in Rosebud County. Interstate Highway 94 bounds the study area on the north. The Tullock Creek divide forms the west and southwest boundary. Armells and Reservation Creek divides are on the east and the Rosebud Creek divide is the southeast boundary.

Table 1. Area of the Sarpy Creek drainage by county in square miles, acres and hectares.

	Area			
	Square Miles	Acres	Hectares	Percent
Treasure County	314.1	200,856	81,286	62
Big Horn County	176.8	113,386	45,887	35
Rosebud County	15.4	9,719	3,933	3
Sarpy Study Area	506.3	323,961	131,106	100.0

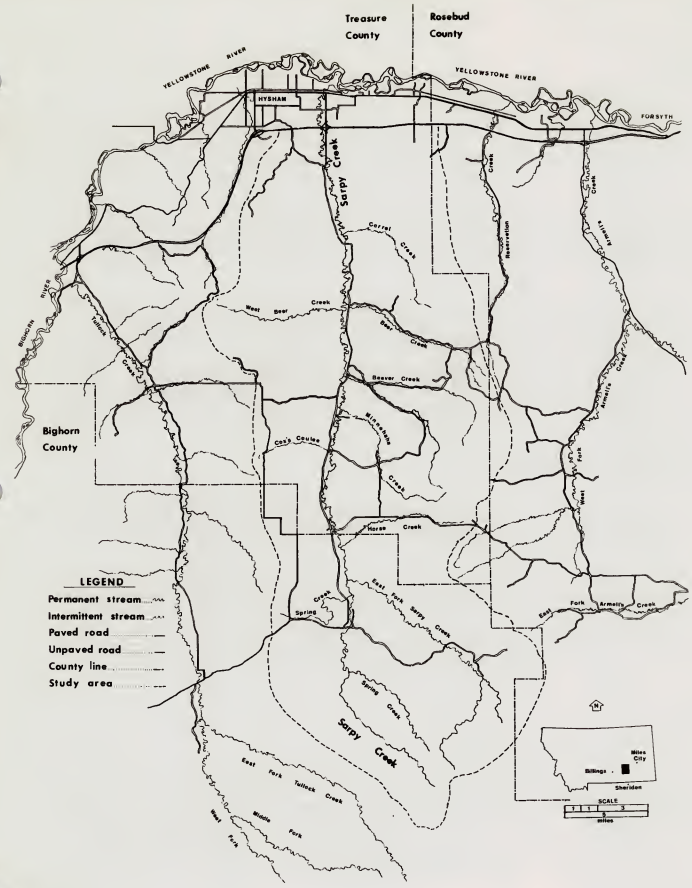

Figure 1. Sarpy Basin wildlife ecology study area.

Physiography and Climate

A general description for the area is presented in the first annual report (Martin 1975). In summary, elevation ranges from 2650 feet to 4820 feet, average annual precipitation ranges from 10 to 20 inches, and temperatures range from an average of 17.5 F in January to 72.8 F in July.

During the past study year 15.52 inches of precipitation were recorded at the Hysham 25 SSE station (Appendix Table 21). This station is located within the study area near the mouth of Horse Creek. Average monthly temperature ranged from 14.0 F in February to 71.9 F in July (USDC 1975).

A qualitative description of the first 2 years of study follows: both winters were quite mild with only a few days of intense cold. Snow cover was relatively light and of short duration. The early part of the 1974 spring was dry and mild, followed by several weeks of rain and cold. The 1975 spring was cold, wet and windy throughout. The summer of 1974 was much hotter and dryer than that of 1975. Fall temperatures were very mild both years. Total precipitation for both years (USDC 1974 and 1975) was both above the 10-14 inch average (Jackson 1971).

Edaphic Characteristics

The six general soil associations are depicted in Figure 2. Brief topography, surface runoff and vegetative descriptions from the Treasure County soil survey (Moshier and Fielder 1967) and the Big Horn County soil survey (Meshnick et al. 1972) are reported in Appendix Table 22.

The Bainville-Midway (T)/Thedalund-Midway (B) association makes up 64.6 percent of the study area (Table 2). It is followed by the Wibaux-Thedalund-Spearman (B) and Flasher-Banville (T)/Nelson-Alice (B) associations with 9.7 percent and 9.2 percent, respectively. The Pierre-Lismas (T) association has 7.8 percent. The Wayden-Regent (B) association with 5.0 percent, and the Wanetta-Hesper (T) association with 3.7 percent comprise the remainder of the study area.

Vegetation Characteristics

The five vegetation types described in last year's (Martin 1975) report were used with a few modifications. As last year, four of the types represent native vegetation, while the fifth represents agricultural development. The five types are ponderosa pine, sagebrush, grassland, creekbottom and agriculture. The technique of vegetative mapping using infrared photo-interpretation was investigated. No actual mapping or quantitative work was accomplished during the year.

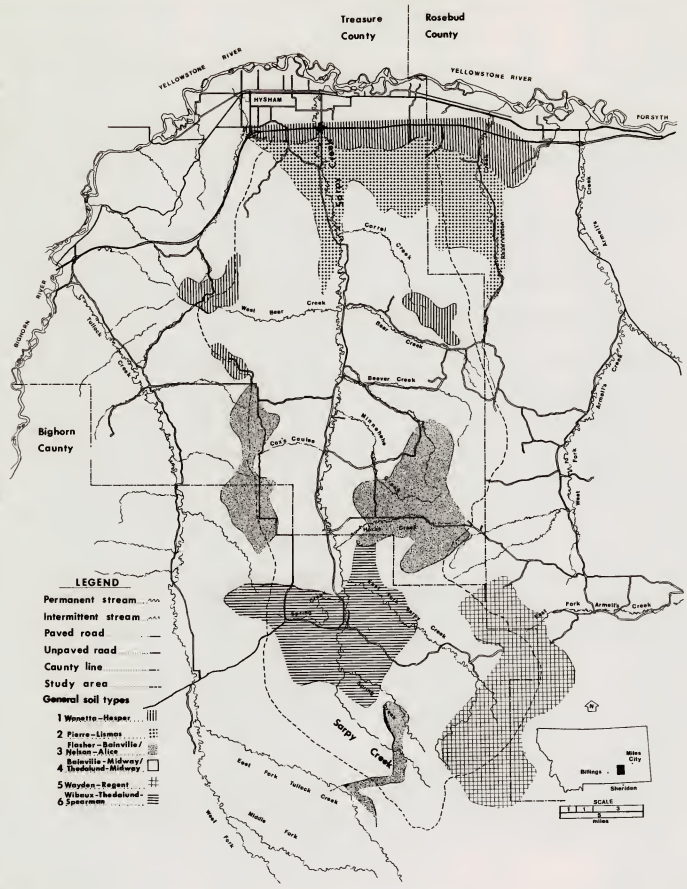

Figure 2. General soil associations found in the Sarpy Creek drainage.

Table 2. Soil association areas, in square miles, acres and hectares and percent of total for the Sarpy Creek drainage.

Soil Association	Area			
	Square Miles	Acres	Hectares	Percent
1. Wanetta-Hesper (T)	18.9	12,068	4,884	3.7
2. Pierre-Lismas (T)	39.4	25,202	10,199	7.8
3. Flasher-Bainville (T)/ Nelson-Alice (B)	46.4	29,724	12,029	9.2
4. Bainville-Midway (T)/ Thedalund-Midway (B)	327.3	209,462	84,769	64.6
5. Wayden-Regent (B)	25.4	16,224	6,566	5.0
6. Wibaux-Thedalund-Spearman (B)	48.9	31,281	12,659	9.7
Sarpy Study Area	506.3	323,961	131,106	100.0

Ponderosa Pine Type

This type appeared to occupy the largest area and was the most diversified. It was divided into five subtypes based on the shrub development of the understory.

(1) Ponderosa pine subtype

This subtype was defined as dense stands of ponderosa pine *(Pinus ponderosa)* occurring without a well developed understory. The upper right corner of Figure 3 depicts this subtype.

(2) Sagebrush subtype

This subtype was amended to include both big sagebrush *(Artemisia tridentata)* and silver sagebrush *(Artemisia cana)*. Areas similar to that shown in the upper central portion of Figure 3 were classified in this subtype.

Figure 3. Ponderosa pine vegetation type with ponderosa pine and sagebrush subtypes.

(3) Grassland subtype

The grassland subtype occurred in thin stands of ponderosa pine on level to rolling terrain. This type had no shrub development as shown in the left-central portion of Figure 4.

Figure 4. Ponderosa pine grassland subtype (center) with creekbottom vegetation type (foreground).

(4) Skunkbush subtype

The development of skunkbush sumac *(Rhus trilobata)*, usually on steep southward facing slopes, in association with sparse stands of ponderosa pine (Figure 5), was the criteria for this subtype. This is identical to the *Rhus* subtype reported last year and described in detail by P. R. Martin (1972).

Figure 5. Skunkbush subtype of ponderosa pine vegetation type.

(5) Juniper

This subtype occurs on northward-facing slopes (see righthand portion of Figure 6). Rocky mountain juniper *(Juniperus scopulorum)* is the dominant shrub. This subtype appears to be the least significant, at least in terms of total area, of all subtypes.

Figure 6. Juniper subtype of ponderosa pine vegetation type (righthand side) adjacent to sagebrush vegetation type.

Sagebrush Type

This type is defined as those areas where either big sagebrush (Figure 7) or silver sagebrush (Figure 8) are the dominant shrub species. There are two subtypes, sagebrush and grassland. The grassland subtype occurs as small islands of grass within the sagebrush subtype. Several grassland subtypes are evident in the central portion of Figure 7.

Figure 7. Sagebrush vegetation type (background and right portion) and shrub subtype of creekbottom vegetation type (center).

Figure 8. Silver sagebrush coulee within sagebrush vegetation type.

Grassland Type

This type is the opposite of the sagebrush type. Grassland is dominant, with isolated areas of sagebrush. Sarpy Basin proper (Figure 9) is categorized as a grassland subtype of the grassland type. Also readily discernible in Figure 9 is a portion of the Little Wolf Mountains, left horizon, and a very important mule deer winter range along the ponderosa pine ridge adjacent to the basin. Figure 10 shows another grassland type in the Sarpy drainage area which is an important antelope fawning area.

Figure 9. Grassland vegetation type (center and foreground) in Sarpy Basin.

Figure 10. Antelope (center) in grassland vegetation type.

Creekbottom Type

Sarpy Creek and its larger tributaries contain the two creekbottom subtypes. The cottonwood subtype is defined as having plains cottonwood *(Populus deltoides)* present. The shrub subtype occurs in the absence of cottonwood trees. Figure 11 shows a representative portion of Sarpy Creek with a silver sagebrush bottom, cottonwood trees and alfalfa hay meadows. Several other types and subtypes are also evident near the all-important creekbottom.

Figure 11. Sarpy Creek with cottonwood and shrub subtypes of creekbottom vegetation type.

Agricultural Type

This type is located within the natural types and includes all monocultures introduced by man from alfalfa and corn on the creekbottoms to barley and wheat on the uplands. The three subtypes are:

(1) Ponderosa pine (Figure 12)
(2) Sagebrush-grassland (Figure 9)
(3) Creekbottom (Figure 11).

Figure 12. Ponderosa pine subtype of agricultural vegetation type (upper portion).

WILDLIFE ECOLOGY

Primary emphasis was placed on the three most common game species, mule deer *(Odocoileus hemionus)*, pronghorn antelope *(Antilocapra americana)* and sharp-tailed grouse *(Pedioecetes phasianellus)*. Ring-necked pheasants *(Phasianus colchicus)* which are abundant along portions of Sarpy Creek bottom, Merriam's turkey *(Meleagris gallopavo merriami)*, sage grouse *(Centrocercus urophasianus)*, white-tailed deer *(Odocoileus virginiana)* and coyotes *(Canis latrans)* are also discussed.

Mule Deer

A concerted effort was made to get a maximum number of observations during all seasons and in all portions of the study area. The result was 1467 mule deer in 301 observations. This compares with the 531 deer in 92 observations reported last year (Martin 1975).

Distribution

Seasonal mule deer observations are shown in Figure 13. The observations appear over most of the study area, with only the extreme northern and upper western portions being deficient. The preponderance of observations in all seasons except winter were along creekbottoms, especially Sarpy Creek and Horse Creek. During winter, mule deer seemed to move to

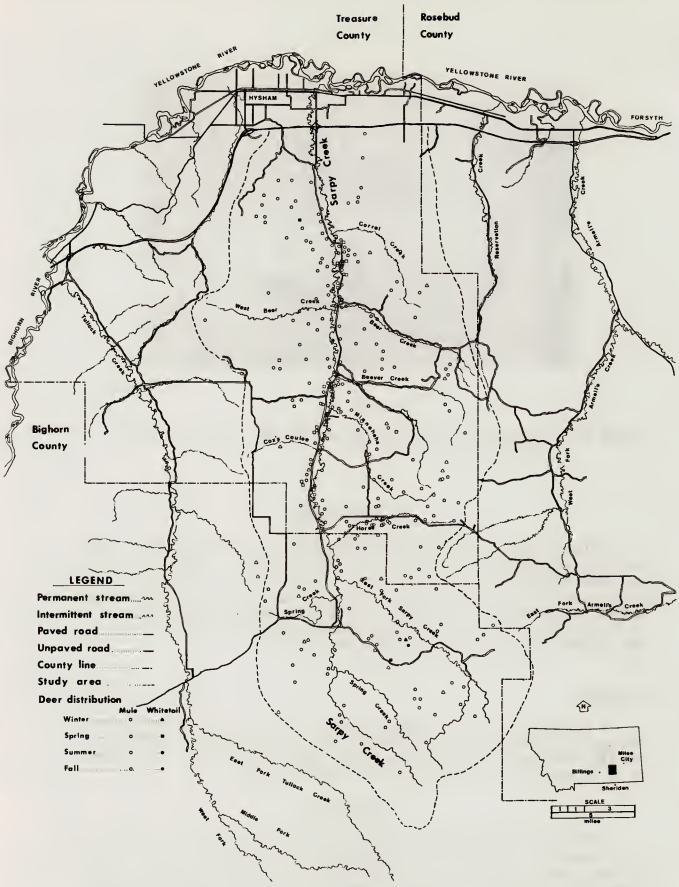

Figure 13. Mule deer and white-tailed deer observations in the Sarpy Creek study area in 1975.

higher ground on the ridges and plateaus between drainages. Some bias is encountered because road observations are necessarily made along the creekbottoms. The fact that creekbottoms green up early in the spring and retain succulent vegetation during the hot, dry summer and fall periods is probably the explanation for the distribution pattern. Hunting pressure in late fall along the creekbottoms undoubtedly helps to disperse the mule deer back into the rougher terrain where they remain during the winter. The lack of deep snow on steep south-facing slopes, wind-blown ridges and excellent cover account for their use of the hilly country in winter. Knapp (1975a, 1975b) reported a very similar distribution pattern for mule deer in the Birney-Decker area.

Exact home range size and seasonal movement for individual deer has not been determined in the Sarpy Creek area. Dusek and McCann (1975) documented home range sizes of 720 acres and 380 acres for two adult female deer in the Bull Mountains. Knowles (1975) reported a normal range of 767 acres for a radio-marked mule deer doe in the Missouri breaks. He also reported 1,863-acre and 1,498-acre normal range sizes for two mule deer bucks in the same region.

Population Characteristics

Several very interesting trends are developing in the Sarpy Creek mule deer population (Table 3). Fawn per 100 doe ratios have decreased from 86 to 77 to 71 from the fall of 1973 to the fall of 1975. During the same time, the percentage of adult bucks in the population (Figure 14) has decreased from 17 percent to 10 percent, and adult females have increased from 45 percent to 53 percent of the population. These trends have resulted in a fawn per 100 adult ratio that is very stable (Figure 14), 62, 59 and 60 for the fall seasons of 1973, 1974 and 1975, respectively.

Eustace (1974) states that fawn production of 40 to 59 fawns/100 does is poor, 60 to 79 fawns/100 does is fair and 80 to 99 fawns/100 does is good. He further states that fawn production in all of Region 7 in 1973 was 88 fawns/100 does. Hunting units 720 and 722 had 70 and 43 fawns per 100 does, respectively. Sarpy Creek production, with 86 fawns/100 does in 1973, was average for southeastern Montana, and better than that of the immediately surrounding area.

There were 36 fawns per 100 does observed in the Bull Mountains during the fall of 1974 (Dusek and McCann 1975). Knapp (1975a) reported 55, 62, 58 and 52 fawns per 100 does in four coal lease areas within the Decker-Birney study area during the fall of 1974. Knowles (1975) recorded 50.0 and 54.8 fawns per 100 does in two pastures of the Nicholes Coulee RCA in the Missouri breaks during January of 1974 and 1975, respectively. Reproduction in Sarpy Creek, at 77 fawns per 100 does in the fall of 1974 and 71 fawns per 100 does in the fall of 1975, is higher than any of these eastern Montana areas.

Mackie (1970) observed fawn per 100 doe ratios ranging from 39.5 to 86.4 during his 4-year study in the Missouri breaks. The average for those years, 1960-1963, was 66.2 fawns per 100 does. This is below the 3 year, 1973-1975, average of 78 fawns per 100 does in the Sarpy Creek area.

Table 3. Mule deer population characteristics in the Sarpy Creek drainage.

Season	Year	Bucks	Does	Fawns	Uncl.	Total	Fawns: 100 Does	Fawns: 100 Adults	Bucks 100 Does	Population Structure (percent) Bucks	Does	Fawns
Fall [1]	1973	8	21	18	-	47	86[4]	62	38	17	45	38
Winter Dec.-Feb.	73-74	12	44	36	30[2] 10[3]	132	82	55	27	13	48	39
Fall Sept.-Nov.	1974	31	104	80	-	215	77	59	30	14	48	37
Winter Dec.-Feb.	74-75	28	139	110	35[2]	312	79	66	20	10	50	40
Fall Sept.-Nov.	A[5]	52	292	225	-	569	77	65	18	9	51	40
	V	17	72	35	-	124	49	39	24	14	58	28
	1975	69	364	260	-	693	71	60	19	10	53	37

1/ Based on observations by Stephen J. Knapp, biologist, Montana Department of Fish and Game.
2/ Unclassified by sex or age.
3/ Unclassified adults.
4/ All percentages rounded to nearest whole number.
5/ A - observed from airplane; V - observed from vehicle.

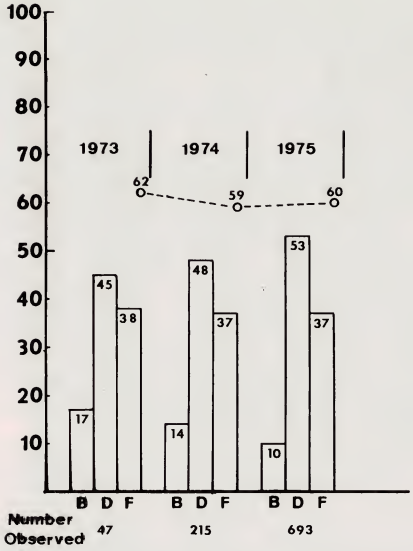

Figure 14. Fall mule deer population structure (percent bucks, does and fawns - bar graph) and production (fawns per 100 adults - line graph) in the Sarpy Creek drainage from 1973 through 1975.

Obviously, the Sarpy Creek deer herd, even with the slight decline in fawn production since the fall of 1973, is in fair to good condition, even compared to the so-called "good old days" of the late 50's and 60's. As one of the very best deer herds in all of Montana, it should receive special consideration when energy development trade-offs are made.

The Montana Department of Fish and Game has used the fawn/100 adult ratio (Figure 15) as indices of the condition of mule deer herds throughout the state. Region 7, southeastern Montana, herd productivity has decreased from an all-time high in 1971 to a record low in 1974. Production in hunting units 720 and 722, which Sarpy Creek divides, appears to have bottomed out in 1973, and is increasing again. As mentioned above, using the fawn/100 adult ratio, the Sarpy area appears to have a stable population that is in substantially better condition than either hunting units 720 or 722.

Nineteen years of mule deer harvest statistics (Figure 16) reveal that the number of deer legally harvested has gone through at least one complete cycle. Hunting units 720 and 722 were carved out of old unit 72 in 1968, following a low harvest, to provide better management of the deer herds. Harvest in unit 720 has remained more or less stable while harvest in unit 722 peaked in 1971, decreasing since then in a pattern similar to that of old unit 72. Eustace (1974) indicated that the percentage of bucks killed by hunters increased as the total number of deer harvested decreased. If the number harvested is related to the population level, then as the population decreased, the percentage of bucks harvested would increase. This natural application of a "Buck Law" by hunters would explain why the percentage of bucks in the Sarpy Creek herd has decreased (Figure 14) if the herd has, in fact, decreased. This line of reasoning leads to further speculation. If the Sarpy Creek mule deer population is decreasing in size, why is it and at what point will it stop? What is the carrying capacity of the Sarpy Creek habitat? Only further study will answer these and other related questions.

Seasonal Use of Soil Associations

Mule deer observations segregated by soil type and season are shown in Table 4. As last year, the Bainville-Midway/Thedalund-Midway association (B/T-M) had the most usage with 70 percent of the observations. It had 76 percent and 78 percent of the mule deer observed in 1975 and 1974, respectively.

A chi-square value (X^2) was calculated for mule deer usage of each soil type in all seasons during 1974 and 1975. The results are presented in a histogram (Figure 17). The formula $X^2 = 4d^2/n$ (Snedecor and Cochran 1967), where d = the absolute value of the deviation between the number of mule deer observed and the number expected and n = the total number of deer observed during the particular season, was used. Two soil associations, Pierre-Lismas (P-L) and Wayden-Regent (W-R), had significantly fewer deer ($p = .05$, Table 4) than might have been expected. Only the

Table 4. Seasonal use of soil associations by mule deer.

Soil Association	Winter '74-'75 46 - 312[1]		Spring '75 49 - 387		Summer '75 39 - 75		Fall '75 167 - 693		Yearly Total 301 - 1467	
1. Wanetta-Hesper (T)[2]	-	-	2[3]	2[4]	3	5	1	1	1	1
2. Pierre-Lismas (T)	-	-[N 5]	8	7	5	7	6	4[N]	5	4[N]
3. Flasher-Bainville (T)/ Nelson-Alice (B)	9	7	6	2	26	29[P]	12	11	12	10
4. Bainville-Midway (T)/ Thedalund-Midway (B)	72	75[P]	80	83[P]	62	56	69	75[P]	70	76[P]
5. Wayden-Regent (B)	-	-	-	-	-	-	3	2	2	1[N]
6. Wibaux-Thedalund-Spearman (B)	20	18[P]	4	3[N]	5	3	9	6	9	8

1/ Number of group observations - total observed.
2/ (T) - Treasure County; (B) - Big Horn County.
3/ Percent of group observations.
4/ Percent of total.
5/ N - negative usage significant at p = .05.
P - positive usage significant at p = .05.

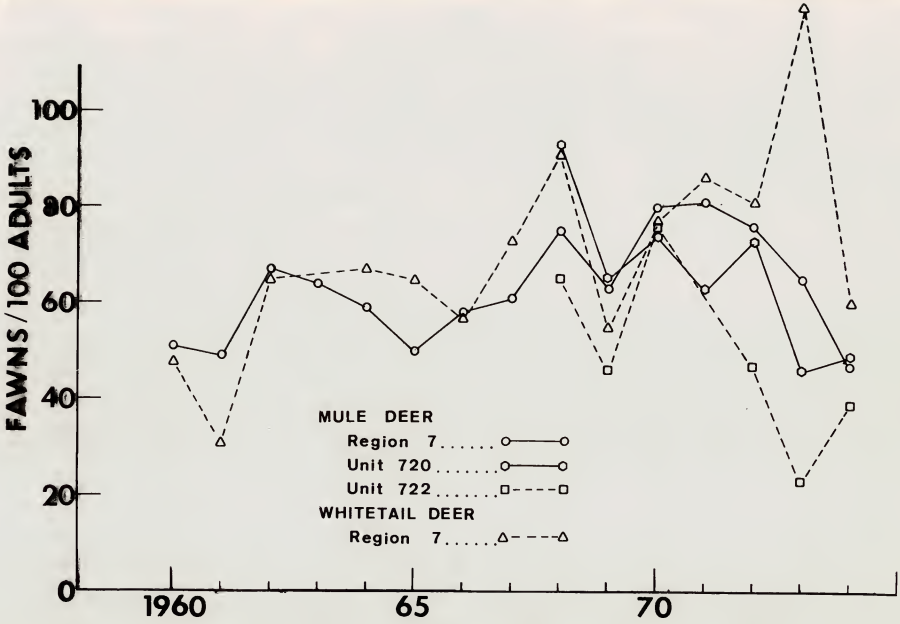

Figure 15. Mule deer and white-tailed deer production statistics.

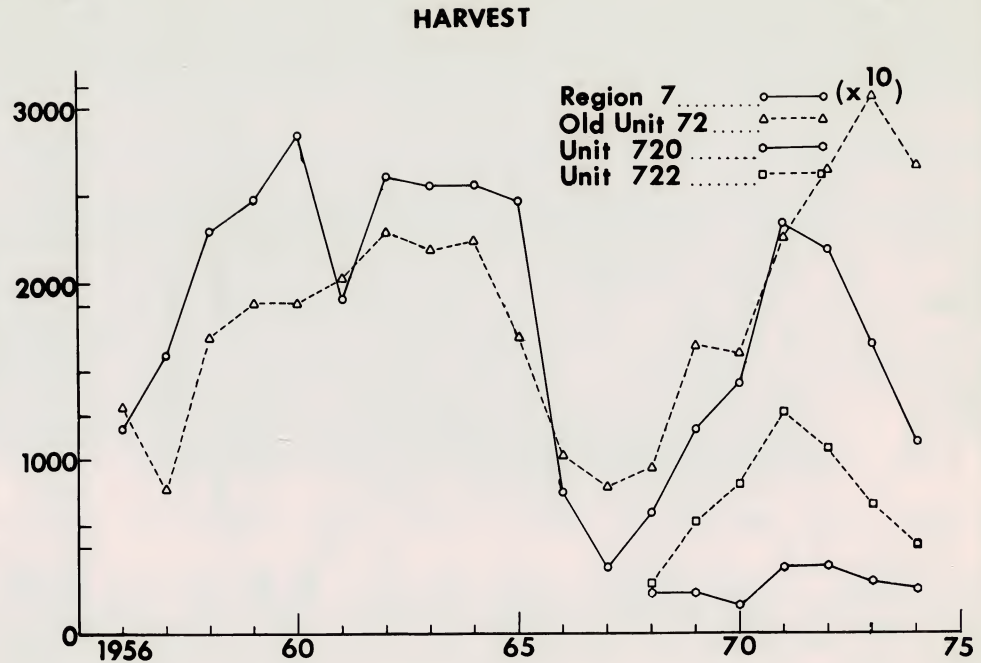

Figure 16. Mule deer harvest statistics.

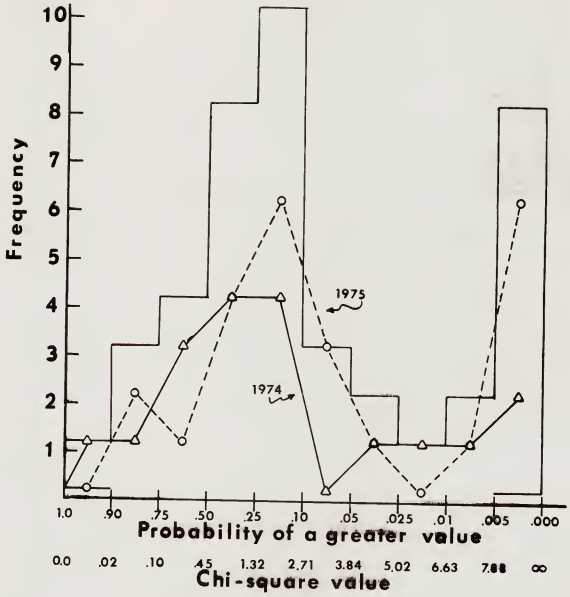

Figure 17. Histogram of chi-square values for mule deer seasonal distribution by soil association in 1974 and 1975.

B/T-M association demonstrated significant ($p = .05$) mule deer preference on a yearly basis in 1975. All future references to significant deviations will be at the $p = .05$ level.

Winter: The B/T-M association, with 75 percent of the mule deer observed, and the Wibaux-Thedalund-Spearman (W-T-S) association, with 18 percent, had significantly more deer than expected. The P-L association with no observations was the only soil association to register a significant negative posture. All observations were made in three of the six soil associations.

Spring: Although there was more diversity, observations being recorded in five of the six associations, the percentage of observations in the B/T-M association increased to 80 percent. The P-L association was second with 8 percent of the observations and 7 percent of the deer observed. The W-T-S association's percentage of mule deer observed decreased from 18 to 3 percent. This figure was significantly lower than expected.

Summer: Five of the six associations received mule deer usage. The B/T-M association had the highest number of mule deer, with 56 percent, but this was the only season in which it did not have significantly more deer than expected. The Flasher-Bainville/Nelson-Alice (F-B/N-A) association, which had 26 percent of the observations and 29 percent of the total observed, did have significantly more deer than expected.

Fall: Observations were recorded in all six soil associations. The B/T-M association again demonstrated significantly more deer than expected. It had 69 percent of the observations and 75 percent of the mule deer observed. The F-B/N-A association had the second highest usage with 11 percent of the total deer observed. This was not significantly different from its expected value. The P-L association once again had significantly fewer deer than expected.

Seasonal Use of Vegetation Types

The yearly totals show that the ponderosa pine vegetation type was the most important to mule deer (Table 5). Forty-four percent of all deer observed were in this type. Since deer are hardest to see in this type, that figure probably understates the importance of the ponderosa pine type. The agricultural and sagebrush types had 19 and 17 percent of the mule deer observations, respectively. Native creekbottom and grassland vegetation types received the least amount of use, with 12 and 7 percent of the mule deer observations, respectively.

Winter: The ponderosa pine type, with 84 percent of mule deer observed, was by far the most heavily utilized. The sagebrush subtype had 28 percent of mule deer observed, a substantial increase over the 4 percent recorded last year (Martin 1975). It was followed by the ponderosa pine and skunkbush subtypes, with 23 and 22 percent of mule deer observed, respectively. The skunkbush subtype had the highest number of group observations (30 percent).

Table 5. Seasonal use of vegetation types by mule deer.

Vegetation Types	Winter '74-'75		Spring '75		Summer '75		Fall '75		Yearly Total	
	46	312[1]	49	387	39	75	167	693	301	1467
Ponderosa pine	22[2]	23[3]	2	2	20	16	22	16	18	14
Sagebrush	26	28	14	11	8	7	7	8	11	13
Grassland	2	4	8	7	-	-	5	7	5	6
Skunkbush	30	22	6	5	15	24	4	4	10	9
Juniper	4	6	-	-	3	4	2	2	2	2
Total Ponderosa pine	85	84	31	25	46	51	40	36	46	44
Sagebrush	4	9	18	21	23	20	13	15	14	16
Grassland	-	-	4	4	8	9	1	1	2	2
Total Sagebrush	4	9	23	25	31	29	14	16	16	17
Grassland	-	-	12	11	5	8	5	6	5	6
Sagebrush	2	1	4	3	-	-	1	tr[4]	1	1
Total Grassland	2	1	16	14	5	8	5	6	7	7
Cottonwood	-	-	2	1	5	3	8	8	6	4
Shrub	2	3	2	3	3	1	16	13	10	8
Total Creekbottom	2	3	4	4	8	4	25	21	16	12
Ponderosa pine	7	3	4	2	-	-	3	4	3	3
Sagebrush/Grassland	-	-	6	10	-	-	2	2	2	3
Creekbottom	-	-	16	21	10	8	11	15	10	13
Total Agricultural	7	3	27	32	10	8	16	21	15	19

1/ Number of group observations - total observed
2/ Percent of group observations
3/ Percent of total
4/ tr = trace; a percentage less than .05

Spring: The agricultural type had the highest number of mule deer (32 percent) followed by the ponderosa pine and sagebrush types with 25 percent each. This pattern differentiated substantially from the year before when the ponderosa pine type dominated with 70 percent, sagebrush had 16 percent and the agricultural type had only 6 percent of the mule deer observed (Martin 1975).

Summer: Mule deer returned to using the ponderosa pine type. It had 51 percent of the observations. The sagebrush type had 29 percent of the mule deer observed. Use of the agricultural type dropped off to 8 percent.

Fall: Usage of the ponderosa pine type remained relatively high at 36 percent, unlike 1974 when fall use was only 8 percent of total mule deer observed. Mule deer observed in creekbottoms increased from 3 to 4 percent in each of the three preceding seasons to 21 percent in the fall. Desiccation of forage in the xeric uplands probably accounts for this shift. Usage of the creekbottom type was less than half that recorded in 1974 (Martin 1975) indicating an improved range condition in 1975. Agricultural usage was 21 percent and sagebrush type usage was 16 percent.

Seasonal Activity

The activity of mule deer at the time of observation is presented in Table 6. Thirty-nine percent of the yearly total were feeding, with the peak coming during the spring season when 74 percent of the deer observed were feeding. Deer standing or running, 35 and 9 percent, respectively, may have been engaged in another activity prior to being observed. At least 17 percent of the observations were of deer lying down. Since deer are difficult to see under any condition, and are especially so when they present a low, immobile profile, usually in good cover when lying down, the numbers not observed in this activity are undoubtedly very high.

Table 6. Seasonal activity of mule deer

	Winter '74-'75		Spring '75		Summer '75		Fall '75		Yearly Total	
Activity	46	312 1/	49	387	39	75	167	693	301	1467
Standing	67 2/	58 3/	16	12	31	29	48	39	44	35
Running	-	-	10	8	26	20	13	12	12	9
Lying	20	35	4	6	10	8	15	17	13	17
Feeding	13	7	69	74	33	43	25	33	31	39

1/ Number of group observations - total observed.
2/ Percent of group observations.
3/ Percent of total.

Seasonal Use of Topography

Usage of different topographic features within the Sarpy study area became evident during the first year of study. An attempt was made to document this usage. It can be seen from Table 7 that 42 percent of all mule deer were observed on hillsides, 23 percent on creekbottoms and 12 percent on plateaus. Coulee bottoms, valley floors, ridge tops and coulee heads had 9, 6, 4 and 3 percent of the observations, respectively.

Table 7. Seasonal use of topography by mule deer.

Topography	Winter '74-'75		Spring '75		Summer '75		Fall '75		Yearly Total	
	46	312/	49	387	39	75	167	693	301	1467
Hillside	442/	473/	55	59	46	48	31	29	39	42
Ridge Top	7	6	4	4	5	8	4	3	5	4
Plateau	26	24	20	12	3	1	5	8	10	12
Coulee Hd.	8	11	-	-	-	-	2	2	3	3
Coulee Btm.	15	12	2	2	10	8	14	11	12	9
Valley Flr.	-	-	-	-	15	17	11	12	8	6
Creekbottom	-	-	18	23	21	17	33	35	24	23

1/ Number of group observations - total observed.
2/ Percent of group observations.
3/ Percent of total.

Winter: Hillsides and plateaus received 47 and 24 percent of the observations. These figures are not unlike those reported by Dusek and McCann (1975) for winter use of sidehills and plateaus, 40 percent and 27 percent, respectively, in the Bull Mountains. No mule deer observations were made on major floodplains (creekbottoms) or on the bench areas next to them (valley floors).

Spring: Hillside observations remained high, 59 percent, as usage of creekbottoms increased to 23 percent. Plateau use dropped to 12 percent. Valley floors and coulee heads had no observed usage.

Summer: Again hillsides had the highest number of deer with 48 percent. The shift to lower elevation became evident with creekbottoms and

valley floors each supporting 17 percent of the population and coulee bottoms supporting 8 percent. Knapp (1975b) found 6 percent of his deer observations occurring in coulees and creekbottoms during the spring season and 22 percent in the same topographic features during the summer period.

Fall: Deer were seen utilizing all seven topographic features. Creekbottoms took over the top position, 35 percent, continuing the trend established the prior season. The three lowland features accounted for 58 percent of the mule deer observations compared to 42 percent, 25 percent and 12 percent for the summer, spring and winter seasons, respectively. Usage of hillsides, at its lowest point of the year, accounted for 29 percent of all mule deer observed.

Seasonal Use of Slope

On a yearly basis, flat, gentle and medium slopes were used equally by mule deer (Table 8). Twenty-eight percent, 30 percent and 26 percent of all deer observed were recorded on the three slopes, respectively.

Table 8. Seasonal slope usage by mule deer.

	Winter '74-'75		Spring '75		Summer '75		Fall '75		Yearly Total	
Gradient	46	312 1/	49	387	39	75	167	693	301	1467
Flat	2 2/	1 3/	29	30	26	21	38	40	30	28
Gentle (0-15°)	41	41	29	28	26	24	22	26	26	30
Medium (16-30°)	22	21	37	35	23	24	31	23	30	26
Steep (31-45°)	35	37	6	7	26	31	9	10	15	16

1/ Number of observations - total observed.
2/ Percent of observations.
3/ Percent of total

Winter: Gentle and steep slopes, with 41 percent and 37 percent, were most used. Flat areas were used least (1 percent). This pattern differs from last year (Martin 1975) when steep slopes received 66 percent of the use.

Spring: Use of flats increased to 30 percent as steep slope usage decreased to 7 percent. The late spring with heavy snow during the survey

period accounts for the opposite pattern, 4 percent in flat areas and 34 percent on steep slopes, being observed in 1974. Medium slope usage was highest during this season (35 percent).

Summer: Mule deer were distributed evenly throughout the gradient categories. The most observations were recorded on steep slopes (31 percent) and the least on flat areas (21 percent). Both gentle and medium slopes had 24 percent of the mule deer observed.

Fall: Flat lands received the most usage, 40 percent, followed by gentle slopes with 26 percent and medium slopes with 23 percent. Steep slopes received the least usage with 10 percent of the mule deer observed. This pattern is the same as that documented last year, but does not approach its extremity. In 1974, 90 percent of fall observations were made on flat lands and gentle slopes compared to 66 percent in 1975. Seasonal movement to lower elevations during the fall season, suggested in last year's report (Martin 1975), seems to be substantiated.

Seasonal Use of Exposure

Winter: The relatively mild winter of 1974-1975 shows up in the usage of the various exposures by mule deer (Table 9). The north exposures (N, NE and NW) sustained 42 percent of all observed mule deer. The south exposures (S, SE and SW) had 40 percent. Last year (1974) the south exposures accounted for 35 percent of all mule deer observed, suggesting that both years have had mild winters.

Table 9. Seasonal use of exposure by mule deer.

	Winter '74-'75		Spring '75		Summer '75		Fall '75		Yearly Total	
Exposure	46	312/	49	387	39	75	167	693	301	1467
North	4[2]	5[3]	4	5	10	13	10	11	8	8
South	2	4	4	5	-	-	3	3	3	4
East	4	4	14	16	13	12	13	11	12	11
West	13	13	8	5	10	11	12	12	11	10
NE	26	25	16	13	23	24	5	5	13	12
NW	13	12	4	2	5	4	7	8	7	7
SE	15	15	16	19	8	9	4	3	8	10
SW	20	21	4	5	5	5	8	7	9	9
Flat	2	1	29	30	26	21	38	40	30	28

1/ Number of group observations - total observed.
2/ Percent of group observations.
3/ Percent of total.

Spring: Use of flat areas, discussed in the slope section, increased to 30 percent of all mule deer observed. As during the winter season, observations were made on all exposures. The south exposures, with 29 percent, were slightly ahead of the north exposure observations, which had 20 percent. East vs. west exposure observations flip-flopped. During winter the west exposures led, 13 percent to 4 percent. East exposures received the most usage in spring, leading west exposures 16 percent to 5 percent.

Summer: The south exposure was the only one on which no observations were recorded, while north exposures had 41 percent of mule deer observed, south exposures had only 14 percent. East and west exposures were even with 12 percent and 11 percent of the mule deer observed, respectively. Flat lands had 21 percent of the deer.

Fall: Flat lands, with 40 percent of the mule deer observed, had by far the highest usage. North exposures had 24 percent. South exposure, west exposure and east exposure followed with 13 percent, 12 percent and 11 percent of mule deer observed, respectively. The shift of mule deer to creekbottom usage is again evident, albeit not as strong as reported for last year (Martin 1975) when 68 percent of the mule deer were observed on flat lands.

Pronghorn Antelope

A total of 731 antelope was observed in 92 groups during the second year of the Sarpy Creek study. Numbers observed ranged from 67 in winter to 284 during the fall survey.

Distribution

Seasonal antelope observations are depicted in Figure 18. The area astride the Treasure-Big Horn County line between Horse Creek and Cox's Coulee contains most of the antelope. Another herd lives along the northern boundary of the study area, just south of Interstate Highway 94. One herd apparently used Sarpy Basin during the summer and fall seasons. No winter antelope observations have been recorded there, and only one spring observation was made in 1974 (Martin 1975). The small number of winter observations may indicate an antelope migration into Tullock Creek for the winter season.

Population Characteristics

Observations from the summer and fall seasons for both 1974 and 1975 along with winter 1974-1975 are listed in Table 10. Population structure and production are presented graphically in Figure 19. Using the fall figures, it appears that the population is stable. The percentage of adult bucks decreased from 20 percent to 17 percent. The percentage of adult does increased from 58 percent to 59 percent. The percentage of fawns increased from 22 percent to 24 percent.

Table 10. Antelope population characteristics in the Sarpy Creek drainage.

Season	Year	Bucks	Does	Fawns	Uncl.	Total	Fawns:100 Does	Fawns:100 Adults	Bucks:100 Does	Population Structure (%) Bucks	Does	Fawns
Summer June-Aug.	1974	10	29	17	-	56	59	44	34	18	52	30
Fall Sept.-Nov.	1974	30	86	33	-	149	38	28	35	20	58	22
Winter Dec.-Feb.	1974-75	6	36	10	15[1/]	67	28	24	17	12	69	19
Summer June-Aug.	1975	42	115	40	-	197	35	25	37	21	59	20
Fall	1975	47	168	69	-	284	41	32	28	17	59	24

1/ Unclassified by sex or age.

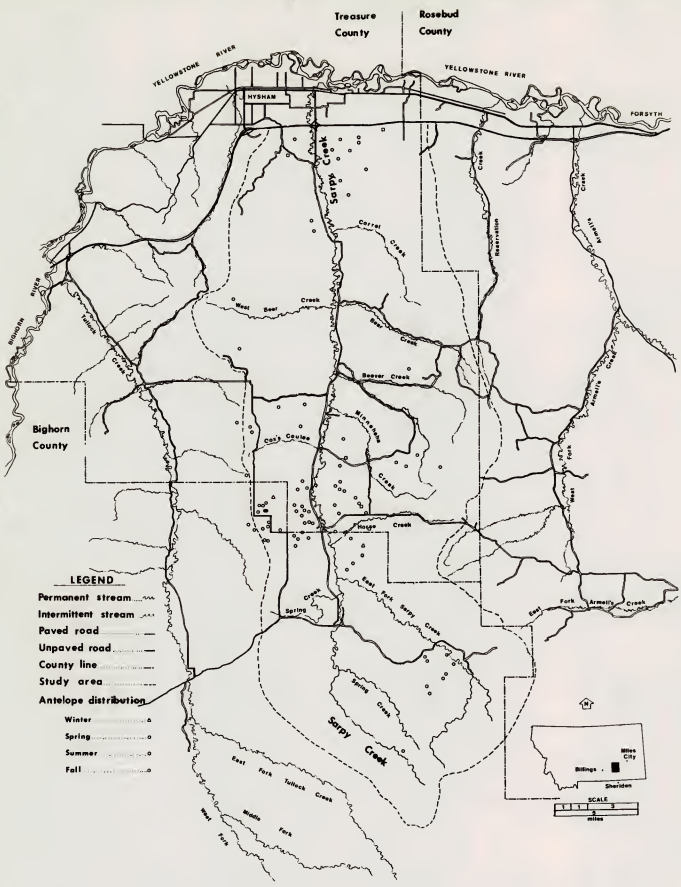

Figure 18. Antelope observations in the Sarpy Creek study area in 1975.

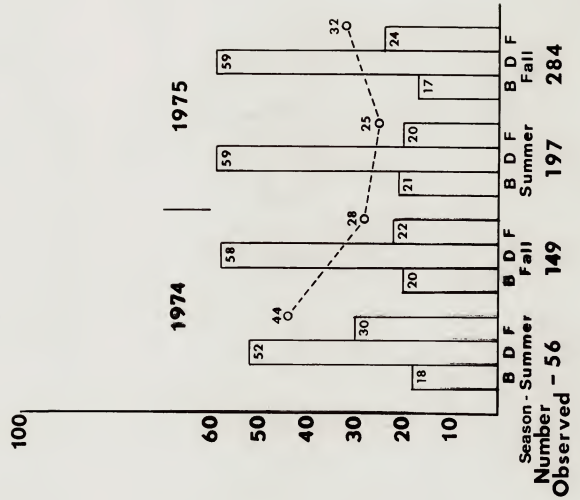

Figure 19. Summer and fall antelope population structure (percent bucks, does and fawns - bar graph) and production (fawns per 100 adults - line graph) in the Sarpy Creek drainage in 1974 and 1975.

The fawn per 100 adult ratio increased from 28 in 1974 to 32 in 1975. Both of these figures are below the average fawn per 100 adult ratios of 48 and 65 reported for Fish and Game hunting units 720 and 722, respectively (Wentland 1974). Dusek and McCann (1975) reported 17 fawns per 100 adults in the Bull Mountains. Knapp (1975a) reported 39 and 40 fawns per 100 adults in two hunting districts in the Birney-Decker wildlife study area.

Antelope harvest (Figure 20) has been very stable in the two hunting units which include the Sarpy study area since 1968 when they were established. Region 7 and old unit 72 harvest numbers have fluctuated with lows occurring generally in the 1957-1959 and 1966-1968 periods. Antelope herds throughout Region 7 are apparently increasing at this time (Eustace 1976).

Seasonal Use of Soil Associations

A pattern very similar to that observed in the previous year (Martin 1975) is recorded in Table 11. The same three soil associations had the most usage both years: the Bainville-Midway/Thedalund-Midway (B/T-M) association had 52 percent of the observations and 50 percent of the antelope observed; the Flasher-Bainville/Nelson-Alice (F-B/N-A) association had 29 percent and 27 percent, respectively; and the Pierre-Lismas (P-L) association had 9 percent and 13 percent, respectively. The Wayden-Regent (W-R) association had no observations.

A chi-square (χ^2) value was calculated for antelope usage of each soil association in all seasons in 1975 and those seasons with reported data in 1974. The same methodology reported in the Mule Deer Seasonal Use of Soil Associations section was used. The results are presented in a histogram (Figure 21). On a yearly basis, the Wanetta-Hesper (W-H), the P-L and the F-B/N-A associations all had significantly ($p = .05$) more antelope than expected. The other three associations (B/T-M, W-R and W-T-S) all had significantly ($p = .05$) fewer antelope than expected. All future references to significant deviations will be at the $p = .05$ level.

Winter: One group of antelope was observed in each of three soil associations. The P-L association (48 percent) had the most antelope, followed by the F-B/N-A association (30 percent) and the B/T-M association (22 percent). P-L association and F-B/N-A association had significantly more than their expected number of antelope and B/T-M association had significantly fewer.

Spring: Four soil associations received antelope usage. The B/T-M association had 49 percent of the observed antelope, followed by 26 percent in the W-H association. The B/T-M association observations were down from the 68 percent observed in 1974 (Martin 1975). The W-H with more antelope and the B/T-M and W-T-S with fewer antelope were the associations with significant deviations from the expected.

Summer: The B/T-M association remained dominant with 46 percent of the antelope observed, even though this figure was significantly less than

Table 11. Seasonal use of soil associations by antelope.

Soil Association	Winter '74-'75		Spring '75		Summer '75		Fall '75		Yearly Total	
	3	67 [1]	18	183	38	197	33	284	92	731
1. Wanetta-Hesper (T)[2]	-	-	22	26[P]	5	6	-	-	7	8[P]
2. Pierre-Lismas (T)	33[3]	48[4]/P[5]	17	10	8	11	3	8	9	13[P]
3. Flasher-Bainville (T)/ Nelson-Alice (B)	33	30[P]	11	15	32	30[P]	36	32[P]	29	27[P]
4. Bainville-Midway (T)/ Thedalund-Midway (B)	33	22[N]	50	49[N]	50	46[N]	58	59	52	50[N]
5. Wayden-Regent (B)	-	-	-	-	-	-	-	-	-	-[N]
6. Wibaux-Thedalund-Spearman (B)	-	-	-	-[N]	5	6	3	1[N]	3	2[N]

1/ Number of group observations - total observed.
2/ (T) Treasure County; (B) Big Horn County.
3/ Percent of group observations.
4/ Percent of total.
5/ N - negative usage - significant at p = .05.
P - positive usage - significant at p = .05.

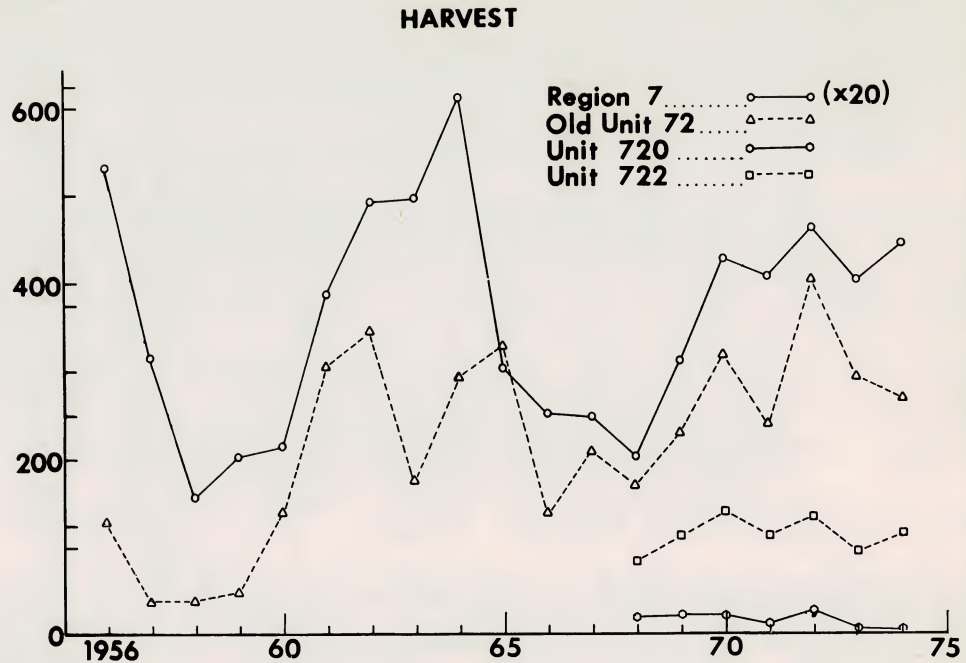

Figure 20. Antelope harvest statistics.

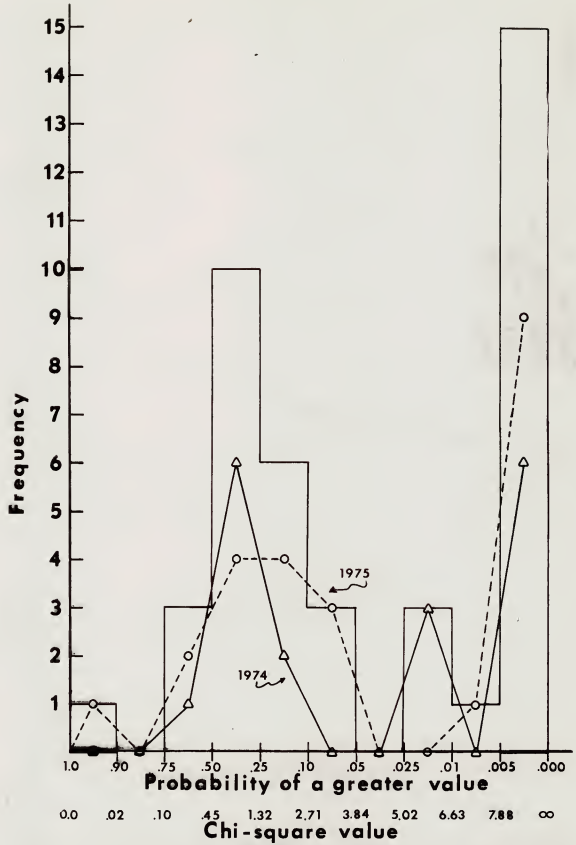

Figure 21. Histogram of chi-square values for antelope seasonal distribution by soil association in 1974 and 1975.

expected. The F-B/N-A association had significantly more antelope than expected with 30 percent of the observed total. The first observations in the W-T-S association were made during the summer survey.

Fall: Again, most observations were recorded in the B/T-M association (59 percent), but for the first time this figure was not significantly different from the number expected. The F-B/N-A association was second, with significantly more than its share of the antelope observed (32 percent). The only other significant deviation was in the W-T-S association which, at 1 percent, had fewer than its expected number of antelope.

Seasonal Use of Vegetation Types

Overall, the grassland and sagebrush types were most important to antelope in the Sarpy Creek study area (Table 12). The grassland type had the most group observations (44 percent) and the highest number of antelope (45 percent). The sagebrush type was close behind in both categories, with 39 percent and 42 percent, respectively.

Winter: Antelope were observed only on the sagebrush and grassland habitat types. Sagebrush was by far the most important with 78 percent of the antelope observed.

Spring: Sagebrush type observations were highest with 44 percent of the groups and 37 percent of the antelope, a decrease from its winter level of usage. Use of grasslands increased to 33 percent of the antelope observed. Antelope made use of the agricultural and creekbottom types with 18 percent and 13 percent, respectively.

Summer: Usage of sagebrush and grassland types increased to 45 percent and 46 percent of the antelope observed, respectively. Use was continued in the agricultural type (5 percent) and observations were made in the ponderosa pine type for the first time this year.

Fall: The percentages of observations and numbers observed continued their steady rise in the grassland type reaching 52 percent and 56 percent, respectively. Sagebrush type was second in importance, with 33 percent and 34 percent, respectively. Antelope continued to make limited use of the agricultural and ponderosa pine types, with 7 percent and 3 percent of the total antelope observed, respectively. As in summer, no antelope were observed on creekbottoms.

Seasonal Activity

The activity of antelope at the moment of observation is recorded in Table 13. The predominant use of open sagebrush or grassland vegetation types by antelope makes them relatively easy to see. They are also able to see the observer quite easily. That explains why 79 percent of the antelope observed were either running or standing alert. Only 43 percent of the mule deer were observed in the same two categories (Table 6). Twelve percent of the antelope observed were feeding and 9 percent were lying down.

Table 12. Seasonal use of vegetation types by antelope.

Vegetation Types	Winter '74-'75		Spring '75		Summer '75		Fall '75		Yearly Total	
	3	67[1]	18	183	38	197	33	284	92	731
Ponderosa pine	-	-	-	-	-	-	-	-	-	-
Sagebrush	-	-	-	-	5	1	3	2	3	1
Grassland	-	-	-	-	-	-	3	1	1	tr[4]
Skunkbush	-	-	-	-	3	3	-	-	1	1
Juniper	-	-	-	-	-	-	-	-	-	-
Total Ponderosa Pine	-	-	-	-	8	4	6	3	5	2
Sagebrush	33[2]	48[3]	44	37	37	39	27	24	35	34
Grassland	33	30	-	-	3	6	6	10	4	8
Total Sagebrush	67	78	44	37	40	45	33	34	39	42
Grassland	33	22	22	30	45	46	42	46	39	40
Sagebrush	-	-	6	3	-	-	9	10	4	5
Total Grassland	33	22	28	33	45	46	52	56	44	45
Cottonwood	-	-	-	-	-	-	-	-	-	-
Shrub	-	-	6	13	-	-	-	-	1	3
Total Creekbottom	-	-	6	13	-	-	-	-	1	3
Ponderosa pine	-	-	-	-	-	-	3	3	1	1
Sagebrush/Grassland	-	-	22	18	8	5	-	-	8	6
Creekbottom	-	-	-	-	-	-	6	5	2	2
Total Agricultural	-	-	22	18	8	5	9	7	11	9

1/ Number of group observations - total observed.
2/ Percent of group observations.
3/ Percent of total.
4/ tr = trace; a percentage less than .05

Table 13. Seasonal activity of antelope.

Activity	Winter '74-'75		Spring '75		Summer '75		Fall '75		Yearly Total	
	3	67[1]/	18	183	38	197	33	284	92	731
Standing	-	-	39	42	58	52	49	33	49	37
Running	67[2]/	78[3]/	17	17	29	37	39	53	32	42
Lying	-	-	22	29	8	7	-	-	8	9
Feeding	33	22	22	13	5	5	12	14	12	12

1/ Number of group observations - total observed.
2/ Percent of group observations.
3/ Percent of total.

Table 14. Seasonal use of topography by antelope.

Topography	Winter '74-'75		Spring '75		Summer '75		Fall '75		Yearly Total	
	3	67[1]	18	183	36	181	33	284	90	715
Hillside	33[2]	48[3]	61	48	83	83	76	76	74	68
Ridge	-	-	6	4	-	-	6	2	3	2
Plateau	33	22	17	29	6	1	6	9	9	13
Coulee Head	-	-	-	-	-	-	-	-	-	-
Coulee Bottom	-	-	11	15	8	9	3	3	7	7
Valley Floor	33	30	6	4	3	7	3	6	4	8
Creekbottom	-	-	-	-	-	-	6	5	2	2

1/ Number of group observations - total observed.
2/ Percent of group observations
3/ Percent of total

Table 15. Seasonal slope usage by antelope.

Gradient	Winter '74-75		Spring '75		Summer '75		Fall '75		Yearly Total	
	3	67[1]/	18	183	36	181	33	284	90	715
Flat	33[2]/	22[3]/	11	10	11	4	18	13	14	11
Gentle (0-15°)	33	30	39	47	28	30	33	31	32	35
Medium (16-30°)	33	48	50	43	50	50	49	56	49	50
Steep (31-45°)	-	-	-	-	11	16	-	-	4	4

1/ Number of group observations - total observed.
2/ Percent of group observations.
3/ Percent of total

Seasonal Use of Topography

Perhaps the best way to approach this section is to state which portions of the topography the antelope did not use. The yearly total (Table 14) reveals that no observations were made in the coulee head category. Ridge tops and creekbottoms each registered only 2 percent of the 715 antelope observed. Coulee bottoms and valley floors were next on the scale of importance, with 7 percent and 8 percent, respectively. Thirteen percent of the observations were made on plateaus. That leaves 68 percent of the antelope observed and 74 percent of the groups observed in the hillside category.

Winter: One observation was made in each of the following topographic categories: hillside (48 percent of antelope observed), valley floor (30 percent) and plateau (22 percent).

Spring: The hillside category accounted for 61 percent of the group observations and 48 percent of the antelope observed. The numbers observed increased to 29 percent on plateaus and from 0 to 15 percent in coulee bottoms. Use of valley floor dropped to 4 percent of the total.

Summer: The hillside usage reached its zenith, with 83 percent of the groups and 83 percent of the total antelope observed. Coulee bottoms and valley floors had 9 percent and 7 percent of the total observed, respectively.

Fall: With 76 percent of both the number of groups and total antelope observed, usage of hillsides is down only slightly from the summer level. The widest diversity was noted during this season, with all types except coulee heads receiving at least some usage. Usage on the minor types ranged from 9 percent of the total on plateaus to 2 percent on ridges.

Seasonal Use of Slope

As observed during the previous year (Martin 1975), gentle and medium slopes provided most of the antelope observations. Eighty-one percent of the group observations and 85 percent of the total antelope observed occurred on these two gradients (Table 15). This compares with the 85 percent and 92 percent, respectively, reported last year. Steep and flat lands had 11 percent and 4 percent of the antelope observed.

Winter: The percentage of antelope observed ranged from 48 percent on medium slopes to 22 percent on flat land. No observations were made on steep slopes.

Spring: Usage of gentle slopes increased from 30 percent of the antelope observed during the winter survey to 47 percent in spring. Medium slope usage remained high, with 50 percent of the group observations and 43 percent of the antelope. Percentage of antelope using flat lands decreased to 10 percent. Again, no usage of steep slopes was recorded. This is in contrast to the previous spring season (Martin 1975) when 15 percent of the antelope observed were on steep slopes and 65 percent utilized medium slopes.

Summer: Antelope were observed on all slopes during this season. The percentage of group observations ranged from 11 percent on flat lands and steep slopes to 50 percent on medium slopes. The medium slopes also had 50 percent of the antelope observed, followed by gentle slopes with 30 percent, steep slopes with 16 percent and flat lands with 4 percent. This is a much more diversified pattern than that exhibited the previous summer (Martin 1975) when 89 percent of the antelope were observed on medium slopes.

Fall: Medium slope usage was again dominant with 49 percent of group observations and 56 percent of antelope observed. Gentle slopes received 31 percent and flat lands received 13 percent of the antelope observed.

Seasonal Use of Exposure

Winter: Seventy percent of the antelope observed were on south exposures or flat land (Table 16). The remaining 30 percent were utilizing a northwestern exposure.

Spring: The southern exposures (S, SE and SW) along with flat lands accounted for 56 percent of the group observations and 37 percent of the total antelope observed. Northerly exposures (N, NE and NW) received 28 percent and 37 percent, respectively. Eastern exposures had 20 percent of the antelope and western exposures had 7 percent.

Summer: Use of northern exposures increased to 43 percent of the total, while use of southern exposures increased from 27 percent during the spring survey to 37 percent. Use of flat lands decreased from 10 percent to 4 percent. Use of eastern and western exposures was practically equal with 8 percent and 9 percent of the antelope observed, respectively. This pattern contrasts with the 1974 season, when 71 percent of antelope observed were on northern exposures (Martin 1975).

Fall: Northern and southern exposures were used equally. Each supported 36 percent of the antelope observed. This compares with 45 percent and 5 percent for the respective exposures the previous year (Martin 1975). Flat land usage increased to 13 percent of the total observed.

White-tailed Deer

Only five observations of white-tailed deer were made during this study period, too few for detailed analysis. It can be stated (Figure 13) that one herd is inhabiting the area south of East Fork Sarpy Creek just east of the Westmoreland mine site. The fall observation consisted of 2 adult males, 5 adult females and 4 fawns.

Whitetail harvest for the hunting units which include Sarpy Creek and southeastern Montana is shown in Figure 22.

Table 16. Seasonal use of exposure by antelope.

Exposure	Winter '74-75		Spring '75		Summer '75		Fall '75		Yearly Total	
	3	67[1]	18	183	36	181	33	284	90	715
N	-	-	-	-	3	5	15	18	7	8
S	33[2]	48[3]	17	12	8	14	9	6	11	13
E	-	-	6	20	11	8	9	6	9	10
W	-	-	11	7	8	9	9	10	9	8
NE	-	-	11	11	22	27	15	11	17	14
NW	33	30	17	26	8	11	6	7	10	15
SE	-	-	28	15	19	17	18	30	20	20
SW	-	-	-	-	8	6	-	-	3	2
Flat	33	22	11	10	11	4	18	13	14	11

1/ Number of group observations - total observed.
2/ Percent of group observations.
3/ Percent of total.

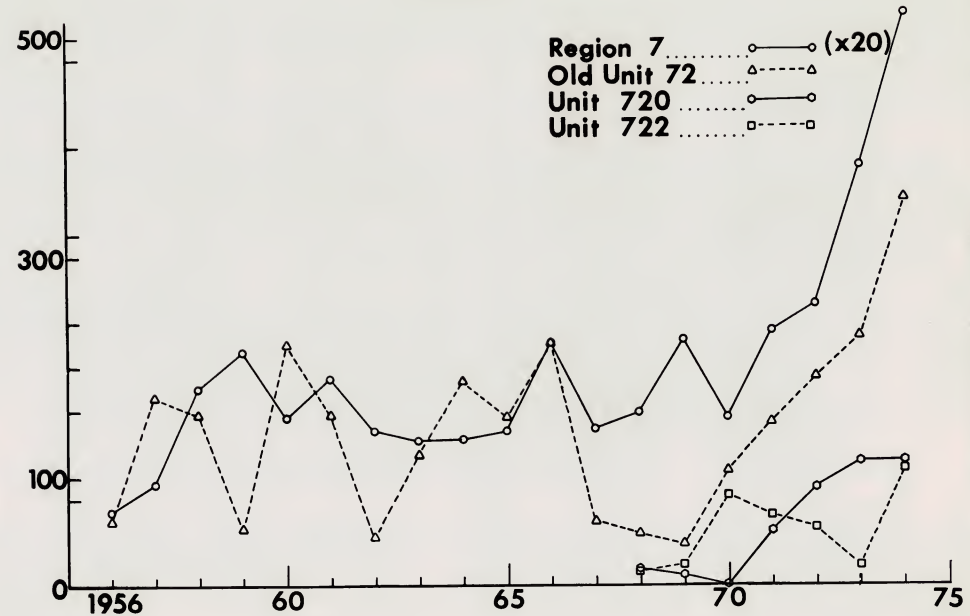

Figure 22. White-tailed deer harvest statistics.

Prairie Grouse

Sixteen sharptail dancing grounds were located this past spring. These, combined with the 16 found in 1974 (Martin 1975), make 32 documented sharptail dancing grounds within or near the Sarpy study area (Appendix Table 21). A total of 413 male birds was observed on dancing grounds. One additional sage grouse strutting ground was found. Forty-two male birds attended the four known strutting grounds. Banding of sharp-tailed grouse on several dancing grounds in the Sarpy Creek and Colstrip vicinities was conducted in cooperation with Fish and Game Department personnel and employees of a private firm, Ecological Consulting Service.

Distribution

Sharptail dancing grounds are shown in Figure 23. Grounds 1 through 16 were located in 1974 while grounds 17 through 32 were found in 1975. Five grounds are situated in the lower section, north of a line across the study area at the mouth of Beaver Creek. Twelve of the grounds are located in the upper portion of the Sarpy drainage, south of a line across the study area at the mouth of East Fork Sarpy Creek. Fifteen grounds are located in the middle section of the Sarpy study area.

Three sage grouse strutting grounds (Figure 23) are located in the middle section of the study area, while one ground is found along the southern edge of the lower section. Grounds 1 through 3 were located in 1974 and ground 4 in 1975.

Population Characteristics

Breeding population information for prairie grouse is shown in Table 17. The number of male birds on individual grounds is presented in Appendix Table 23. The average number of sharptail males per ground in 1975 was 13.8, an increase from the 12.7 observed the previous year. This is below the 15.8 adult males per ground average from 1963 through 1973 for Fish and Game Region 7 (Wallestad 1974). Knapp (1975b) found 11 birds per ground in the Birney-Decker area. Five broods were seen during the summer period, with a total of 33 juveniles or 6.6 young per brood. This compares favorably with the average of 6.7 young per brood for southeastern Montana (Wallestad 1974).

Assuming that sex ratios are equal, that a number of nonterritorial males exist (Rippin and Boag 1974) which may equal the number of males observed on dancing grounds, and that there are 6.6 young per female, an estimation of the total sharptail population can be made from the 413 males observed. There could be between 826 and 1652 adult birds which survived the previous winter. At the rate of 6.6 young per female, between 2725 and 5450 juveniles could have been added to the population. The pre-winter population of sharp-tailed grouse in the Sarpy Creek area would then be approximately 3550 to 7100 birds, or about 6 to 14 birds per square mile. Obviously, Sarpy Creek supports an excellent sharptail population.

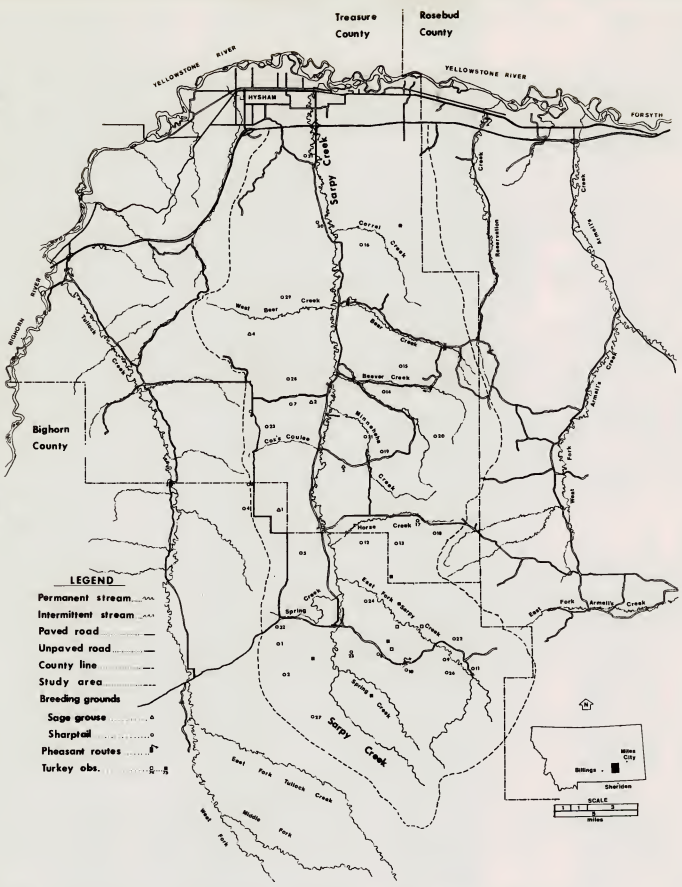

Figure 23. Prairie grouse breeding grounds, pheasant crow count routes and turkey observations (1974 and 1975) in the Sarpy Creek study area.

The number of male sage grouse per strutting ground increased from 11.7 in 1974 (Martin 1975) to 14.0 in 1975 (Table 17). This is below the average for southeastern Montana of 22.7 birds per ground reported by Wallestad (1974) for the 1963-1973 period. No sage grouse broods were observed in the study area.

Table 17. Prairie grouse breeding ground data.

Species	Hunting District	Number of Active Grounds		Male Birds		Male Birds/Active Ground	
		'74	'75	'74	'75	'74	'75
Sharptail	720	7	14	93	172	13.3	12.3
	722	9	16	110	241	12.2	15.0
Sarpy Study Area		16	30	203	413	12.7	13.8
Sage Grouse	720	2	2	19	28	9.5	14.0
	722	1	1	16	14	16.0	14.0
Sarpy Study Area		3	3	35	42	11.7	14.0

Use of Soil Associations

Dancing grounds have been located on four of the six soil associations. The Bainville-Midway/Thedalund-Midway association, with 14, had the most grounds (Table 18). As in 1974 (Martin 1975), it had the highest number of male birds per ground, with 15.1 in 1975 and 13.1 in 1974. The Flasher-Bainville/Nelson-Alice association supported 8 grounds, with 14.0 males per ground. The Pierre-Lismas association had 14.5 male birds per ground, but only two grounds. The Wibaux-Thedalund-Spearman association supported 6 grounds with the smallest average number of males per ground (10.0).

All sage grouse strutting grounds are located in the Bainville-Midway/Thedalund-Midway soil association.

Sharptail Banding Study

In the spring of 1975, a sharp-tailed grouse banding study was undertaken with the cooperation of Robert Greene from the Montana Department of Fish and Game game farm and employees of Ecological Consulting Service. The primary purpose of the study is to learn about the movement, distribution and survival of sharp-tailed grouse whose dancing grounds have been destroyed or altered by strip mining. Some of the unanswered questions

Table 18. Sharptail dancing ground distribution by soil association.

	Active Grounds	Male Birds	Male Birds/ Ground	Soil Association
1.	-	-	-	Wanetta-Hesper (T)
2.	2	29	14.5	Pierre-Lismas (T)
3.	8	112	14.0	Flasher-Bainville (T)/Nelson-Alice (B)
4.	14	212	15.1	Bainville-Midway (T)/Thedalund-Midway (B)
5.	-	-	-	Wayden-Regent (B)
6.	6	60	10.0	Wibaux-Thedalund-Spearman (B)

are: (1) How attached are dominant males, subdominant males and hens to a specific dancing ground? (2) Can sharptails be induced to use alternate sites in native range if their dancing ground is destroyed? (3) Can new dancing grounds be established in reclamation areas? (ECS 1975a).

A total of 82 sharptails was banded with color-coded poncho markers similar to those used by Pyrah (1970) after live trapping with two 50-foot by 100-foot nets. Thirty-one birds on three dancing grounds were banded near the Westmoreland mine in the Sarpy Creek study area (Appendix Table 24). The three grounds on which birds were banded in the Sarpy study area are 8, 10 and 25 (Figure 23). Eleven adult male birds were banded on ground number 8. Thirteen were banded on ground number 10. Six adult males and 1 adult female were banded on ground number 25.

Fifty-one birds on four grounds in the Colstrip vicinity (Appendix Table 25) were banded. A summary of the first year's activities and data gathered in the Colstrip vicinity is presented in the Ecological Consulting Service progress report (1975a).

Work will continue on this project, and any significant discoveries, as well as routine data, will be collectively summarized at a later date.

Ring-necked Pheasants

Pheasant crowing count surveys were conducted in the Sarpy Creek study area during March and April 1975. Similar surveys in adjacent drainages were also conducted. Routes followed are shown in Figure 23.

Inclement weather during the spring season severely limited crow count data. There was an average of 16.7 calls per 2-minute stop in the Sarpy study area (Table 19) during the 1975 spring season. This is an increase from 13.3 calls per stop recorded in 1974. The Tullock Creek drainage was the only area outside the Sarpy Creek area sampled. It increased from 7.6 to 14.6 calls per stop. The lower portion of Sarpy Creek had the highest density of crowing cocks. Forty-eight calls were recorded at one stop. With 24.7 calls per stop, it was slightly above the average for the previous 8 years of 24.3 calls per stop (Wallestad 1974 and Martin 1975). The East Fork Sarpy Creek route showed the greatest increase, from 3.4 to 11.5 calls per stop, within the Sarpy drainage. The 1974 figure may be artifically low due to cloudy weather at the time of the survey.

Three pheasant broods were observed during the summer. A total of 26 young were seen, an average of 8.7 per brood. This is above the 6.8 young per brood average for Fish and Game Region 7 (Wallestad 1974).

Table 19. Ring-necked pheasant crowing count survey data in the Sarpy Creek drainage and adjacent drainages.

Route	1974		1975	
	Length	Calls/Mile	Length	Calls/Mile
*Lower Sarpy Creek	20	27.7	20	24.7
*Upper Sarpy Creek	16	7.9	15	11.8
Lower Tullock Creek	15	4.7	15	11.7
Upper Tullock Creek	14	10.7	15	17.6
*North Fork Beaver Cr.	10	1.8	6	8.0
*East Bear Creek	5	9.8	9	14.2
Armells Creek	21	2.7	-	-
Yellowstone River	23	3.8	-	-
Reservation Creek	16	3.7	-	-
*East Fork Sarpy Cr.	7	3.4	7[1/]	11.5
*Sarpy Study Area	58	13.3	50	16.7
Surrounding Area	89	4.7	30	14.6
Total	147	8.1	80	15.9

1/ Taken from ECS (1975b) report to Westmoreland Resources, Inc.

Merriam's Turkey

Turkeys were planted in the Sarpy Creek area by the Montana Fish and Game Department in 1957 (Greene and Ellis 1971). Turkey observations during 1974 and 1975 are shown in Figure 23. Although the exact number of turkeys in the Sarpy drainage is unknown, it seems that they have adapted to the area, and, nearly two decades after stocking, are at least maintaining a stable population.

Coyotes

Coyotes have recently become as important a species in the political arena as they always have been naturally. Since poison 1080 was banned by executive order in 1972, a great hue and cry has gone up from livestock producers across the country - and, understandably so, as even one lamb or calf lost is money out of the producer's pocket. But do coyotes really seriously affect deer or other wildlife populations? Apparently coyotes on the Welder Refuge in Texas were unable to keep a white-tailed deer herd from remaining stable or increasing in size, even though they killed 42 to 80 percent of each year's fawn crop (Allen 1975). A study by Arrington and Edwards (1951) demonstrated that coyote predation reduced fawn-per-doe ratios for antelope in Arizona, and when coyotes were removed the antelope population steadily increased. As Allen (1975) states, "Each area has different predator-prey characteristics and relationships. While we have experienced deer declines over much of the state, antelope herds in eastern Montana have increased dramatically." He also states that coyote density in Montana ranges from 0.5 to 3 or more per square mile.

Coyote observations in the Sarpy Creek area are shown in Figure 24. The number of coyotes observed in each season is shown in Table 20. The ratio of coyotes to 100 deer observed ranged from 3.8 during the spring survey to 5.3 in the summer. The yearly average was 4.4 coyotes per 100 deer. Since this is the first year these data have been kept, no trends can be discerned concerning the coyote population. The coyote and deer populations appear to be stable, relative to each other.

Table 20. Coyote and mule deer observations made in the Sarpy Creek drainage during 1975.

Season	Coyotes	Mule Deer	Coyotes per 100 Deer
Winter	16	312	5.1
Spring	15	387	3.8
Summer	4	75	5.3
Fall	31	693	4.4
Total	66	1497	4.4

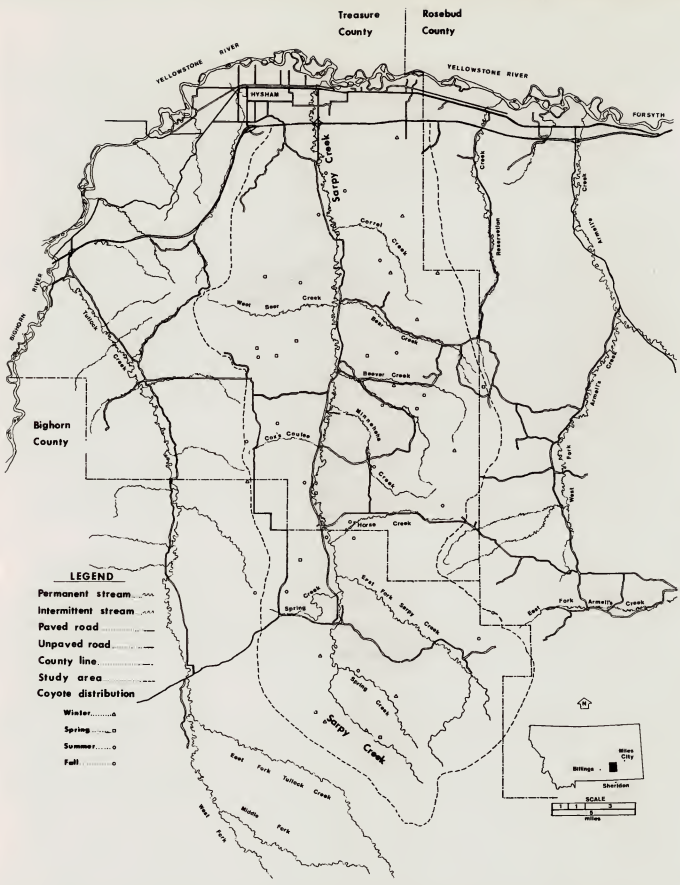

Figure 24. Coyote observations in the Sarpy Creek study area in 1975.

SUMMARY

During the second year of the Sarpy Basin Wildlife Ecology Study the gathering of baseline data begun the first year was continued. Climatic conditions were recorded, vegetation types and subtypes were clarified, and area measurements were obtained for the soil associations as well as the study area itself. Distribution, population characteristics, activities and seasonal use of soil associations, vegetation types, topography, slopes and exposures were discussed for important game species in the area. A special effort was made to obtain maximum observations of mule deer and antelope to obtain a solid quantitative base for future trend analysis. The number of documented sharptail dancing grounds was doubled and one additional sage grouse strutting ground was loacted. A short discussion of coyotes was included along with those of several minor game species.

Some observations and tentative conclusions resulting from the first 2 years of study follow:

(1) The Sarpy study area encompasses 131,106 hectares (506.3 square miles), of which 62 percent is in Treasure County.

(2) Winters for both years were relatively mild. The spring of 1975 was colder and wetter than the previous spring. The summer and fall of 1974 was hotter and dryer than 1975. Both years had above average precipitation.

(3) The mule deer population, which is perhaps the very best in southeastern Montana, is at best stable, and perhaps declining as evidenced by a falling fawn-per-doe ratio. The percentage of adult males in the population, which has declined from 17 percent in 1973 to 10 percent in 1975, may also indicate a reduced population level.

(4) The antelope population, though poor compared to other herds in southeastern Montana, is stable.

(5) Sarpy Creek undoubtedly supports one of the finest sharp-tailed grouse populations in the state.

(6) The ring-necked pheasant population is excellent in certain portions of the drainage, and as a whole, is in good condition.

(7) Coyote numbers vis-a-vis deer numbers appear stable.

(8) Mule deer appear to be actively selecting usage of the Bainville-Midway/Thedalund-Midway soil association, while avoiding the Pierre-Lismas and Wayden-Regent associations ($p = .05$).

(9) Antelope seem to show a preference for the Wanetta-Hesper, Pierre-Lismas and Flasher-Bainville/Nelson-Alice associations, selecting against the other three associations. Even though antelope numbers are significantly ($p = .05$) less than what might be expected on the Bainville-Midway/Thedalund-Midway association, it still supports 50 percent of the Sarpy Creek antelope herd.

(10) The movement to lower elevations during the dry season by mule deer was again evident, although not as pronounced as during the previous year.

(11) The ponderosa pine type was most important to mule deer, while the grassland and sagebrush types were equally important to antelope.

(12) Antelope appear to migrate out of Sarpy Basin before the winter period and return during late spring or early summer. Some of them may be wintering in the Tullock drainage.

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Appendix Table 21. Climatological data from the Hysham 25 SSE weather station during the first 2 years of study.

Season	Month	Year	Temperature[1/] Ave.	High	Low	No. Days Below 32	Maximum Above 90	Precipitation[2/] Total	Snow
	Dec.	1973	26.6	55	-14	7	0	1.05	8.1
Winter	Jan.	1974	18.4	58	-31	15	0	.40	7.1
	Feb.	1974	30.8	57	- 1	4	0	.85	12.5
	Mar.	1974	33.5	66	0	0	0	.62	5.0
Spring	Apr.	1974	46.1	85	20	0	0	2.33	Tr
	May	1974	49.6	80	27	0	0	3.02	Tr
	June	1974	62.6	99	31	0	8	2.85	0
Summer	July	1974	73.1	101	45	0	22	2.30	0
	Aug.	1974	62.4	98	36	0	4	1.03	0
	Sept.	1974	52.9	87	22	0	0	0.97	0
Fall	Oct.	1974	46.7	84	17	0	0	2.36	Tr
	Nov.	1974	33.5	65	- 2	2	0	0.85	0.9
	Dec.	1974	26.5	54	-13	4	0	0.27	4.0
Winter	Jan.	1975	22.1	50	-23	9	0	1.69	10.3
	Feb.	1975	14.0	47	-24	19	0	0.56	7.9
	Mar.	1975	28.8	58	- 4	9	0	0.84	10.4
Spring	Apr.	1975	36.0	72	4	6	0	2.16	18.3
	May	1975	50.0	86	27	0	0	2.58	Tr
	June	1975	58.5	88	34	0	0	2.05	0
Summer	July	1975	71.9	104	38	0	16	1.10	0
	Aug.	1975	66.0	97	37	0	7	0.24	0
	Sept.	1975	55.2	88	22	0	0	0.33	0
Fall	Oct.	1975	45.1	88	17	0	0	2.07	6.0
	Nov.	1975	29.2	77	-20	9	0	1.63	19.4

1/ Temperature in degrees fahrenheit.
2/ Precipitation in inches.

Appendix Table 22. A brief description of the soils series found in the Sarpy Creek drainage.

Series	County[1/]	Topography	Surface Drainage	Vegetation[2/]
Wanetta	Treasure	Level to sloping terraces	Good	Short & mid grasses
Hesper	Treasure	Rolling, eroded uplands	Good	Ag sp; Ag sm; Ar tr
Pierre	Treasure	Rolling, eroded uplands	Good	Ag sp; Ag sm; Ar tr
Lismas	Treasure	Rolling to hilly or strongly dissected uplands	Excessive	Ag sm; St vi; Bo gr; Ar tr;Sa ve
Flasher	Treasure	Rolling to strongly rolling or hilly, eroded uplands	Excessive	Ca lo; St vi; Or hy
Bainville	Treasure	Crests of ridges and hills	Excessive	Brush & trees; short, mid & tall grasses
Thedalund	Big Horn	Undulating to very steep hills	Medium	Ag sm; St vi; Bo cu; Ar tr
Midway	Big Horn-Treasure	Rolling to steep, broken, eroded uplands	Excessive	Ag sp; Ag sm; Bo gr; Ar ca4; Ar tr; Rh tr; Gu sa; Bo cu
Nelson	Big Horn	Undulating and rolling hills & ridges	Medium	Ca lo; Ag sp; Ar ca4; Yu gl
Alice	Big Horn	Moderately steep & rolling valleys	Slow	Ca lo; Bo cu; Bo gr; An sc; Eriog; Ambro
Wayden	Big Horn	Sloping or rolling to very steep hills & ridges	Medium	Ag sp; Ag sm; Gu sa; Ps ar
Regent	Big Horn	Gently undulating to hilly ridges & plains	Slow	Ag sm; Ag tr; Da in; Fe id; Ch na
Wibaux	Big Horn	Undulating to very steep uplands	Rapid	Ag sp; St vi; Ar fr; Gu sa; Ch na
Spearman	Big Horn	Undulating & rolling plains	Medium	St vi; Ag sm; Ar tr; Gu sa

1/ Source of information by county: Treasure - Moshier, R. L. and A. G. Fielder. 1967. Soil survey of Treasure County, Montana. 173 pp.
Big Horn - Meshnick, J. C., et al. 1972. Unpubl. Soil survey of Big Horn County, Montana. 1086 pp.

2/ Plant abbreviations from Anon. 1969. Coded plant list for the state of Montana. Montana Fish and Game Dept. 93 pp.

Appendix Table 23. Location of prairie grouse breeding grounds and male birds attending in 1974 and 1975.

Species	Gr. No.	Location T	R	S	Date Located	Hunting Dist.	Method[1]	Male Birds Attending 1974	1975
Sharp-tailed Grouse	1	1N	36E	24	4/16/74	720	A	6	7
	2	1N	36E	36	4/16/74	720	A	20	9
	3	2N	36E	3	4/23/74	720	V	6	8
	4	2N	36E	10	4/23/74	720	V	15	17
	5	2N	37E	30	3/29/74	720	V	16	13
	6	3N	36E	10	4/ 1/74	720	V	14	11
	7	3N	37E	7	4/ 9/74	720	A	16	20
	8	1N	37E	25	3/26/74	722	V	12	14
	9	1N	38E	27	3/26/74	722	F	9	15
	10	1N	38E	31	3/26/74	722	V	7	15
	11	1N	38E	36	3/26/74	722	V	15	20
	12	2N	37E	23	3/27/74	722	A	13	26
	13	2N	38E	19	3/27/74	722	A	12	9
	14	3N	37E	1	3/27/74	722	A	16	20
	15	4N	38E	31	3/27/74	722	A	10	-
	16	5N	37E	27	3/27/74	722	A	16	-
	17	2N	38E	17	3/31/75	722	A	-	12
	18	2N	38E	22	3/31/75	722	A	-	8
	19	3N	37E	25	3/31/75	722	A	-	16
	20	3N	38E	22	3/31/75	722	A	-	12
	21	3N	37E	23	4/ 3/75	722	A	-	18
	22	1N	38E	23	4/10/75	722	V	-	8
	23	3N	36E	14	4/15/75	720	V	-	18
	24	1N	37E	13	4/12/75	722	A	-	9
	25	1N	37E	27	4/12/75	722	A	-	9
	26	1N	38E	34	4/12/75	722	A	-	30
	27	1S	37E	9	4/12/75	720	A	-	8
	28	4N	37E	31	4/23/75	720	A	-	10
	29	4N	36E	12	4/23/75	720	A	-	10
	30	5N	37E	18	4/23/75	720	A	-	16
	31	6N	36E	25	4/23/75	720	A	-	13
	32	1N	36E	13	5/ 5/75	720	F	-	12
Sage Grouse	1	2N	36E	12	4/ 9/74	720	A	16	23
	2	3N	37E	8	4/ 9/74	720	A	3	-
	3	3N	37E	27	3/25/74	722	V	16	14
	4	4N	36E	22	4/23/75	720	A	-	5

1/ A = Airplane, V = Vehicle, F = Foot

Appendix Table 24. Neckbanded sharp-tailed grouse in Sarpy Creek vicinity.

Neckband Number	Dancing Ground	Date Banded	Age	Sex	Leg Band Number
WR 26	8	4/17	Adult	Male	F 63032
WR 27	8	4/17	Adult	Male	F 63033
WR 28	8	4/17	Adult	Male	F 63034[1/]
WR 29	8	4/17	Adult	Male	F 63035
WR 30	8	4/17	Adult	Male	F 63036
WR 31	8	4/17	Adult	Male	F 63037
WR 32	8	4/17	Adult	Male	F 63038
WR 33	8	4/18	Adult	Male	F 63039[2/]
WR 34	8	4/18	Adult	Male	F 63040
WR 35	8	4/18	Adult	Male	F 63041
WR 36	8	4/18	Adult	Male	F 63042
YR 10	25	4/17	Adult	Male	F 63001[1/]
YR 11	25	4/17	Adult	Male	F 63002[1/]
YR 12	25	4/18	Adult	Male	F 63003
YR 13	25	4/18	Adult	Female	F 63004
YR 14	25	4/18	Adult	Male	F 63005[2/]
YR 15	25	4/18	Adult	Male	F 63006
YR 16	25	4/18	Adult	Male	F 63007
RB 26	10	4/17	Adult	Male	F 63026
RB 27	10	4/17	Adult	Male	F 63027[2/]
RB 28	10	4/17	Adult	Male	F 63028
RB 29	10	4/17	Adult	Male	F 63029[1/]
RB 30	10	4/17	Adult	Male	F 63030
RB 31	10	4/17	Adult	Male	F 63031[1/]
RB 32	10	4/18	Adult	Male	F 63043
RB 33	10	4/18	Adult	Male	F 63044
RB 34	10	4/18	Adult	Male	F 63045
RB 35	10	4/18	Adult	Male	F 63046
RB 36	10	4/18	Adult	Male	F 63047
RB 37	10	4/18	Adult	Male	F 63048[2/]
RB 38	10	4/18	Adult	Male	F 63049

1/ Birds retrapped the following day.
2/ Birds injured during trapping.

Appendix Table 25. Neckbanded sharp-tailed grouse near Colstrip.

Neckband Number	Dancing Ground	Date Banded	Age	Sex	Leg Band Number
YB 26	7[1]	4/22	Adult	Male	F 63088
YB 27	7	4/22	Adult	Female	F 63090
YB 28	7	4/22	Adult	Male	F 63091
YB 29	7	4/22	Juvenile	Male	F 63092
YB 30	7	4/22	Adult	Male	F 63093
YB 31	7	4/22	Juvenile	Male	F 63094
YB 32	7	4/22	Juvenile	Male	F 63096
YB 33	7	4/22	Juvenile	Male	F 63097
YB 34	7	4/22	Juvenile	Male	F 63098
YB 35	7	4/22	Adult	Male	F 63099
YB 36	7	4/22	Adult	Male	F 63100
YB 37	7	4/22	Adult	Female	F 63050
YB 38	7	4/23	Adult	Male	F 63060
YB 39	7	4/23	Adult	Male	F 63061
YB 40	7	4/23	Juvenile	Male	F 63062
OW 26	8	4/23	Adult	Male	F 63051
OW 27	8	4/23	Adult	Male	F 63052
OW 28	8	4/23	Adult	Male	F 63053
OW 29	8	4/23	Juvenile	Male	F 63054
OW 30	8	4/23	Juvenile	Male	F 63055
OW 31	8	4/23	Juvenile	Male	F 63056
OW 32	8	4/23	Juvenile	Male	F 63057
OW 33	8	4/23	Adult	Male	F 63058
OW 34	8	4/23	Juvenile	Male	F 63059
WB 41	16	4/22	Adult	Male	F 63025[2]
WB 42	16	4/22	Adult	Male	F 63079[2]
WB 43	16	4/22	Adult	Male	F 63080
WB 44	16	4/22	Adult	Female	F 63081
WB 45	16	4/22	Adult	Male	F 63082
WB 46	16	4/22	Adult	Male	F 63083
WB 47	16	4/22	Adult	Female	F 63084
WB 48	16	4/22	Adult	Male	F 63085
WB 49	16	4/22	Adult	Male	F 63086[2]
WB 50	16	4/22	Adult	Male	F 63087
BB 26	19	4/21	Adult	Female	F 63008
BB 27	19	4/21	Juvenile	Female	F 63009
BB 28	19	4/21	Juvenile	Male	F 63010
BB 29	19	4/21	Juvenile	Male	F 63011
BB 30	19	4/21	Juvenile	Male	F 63012
BB 31	19	4/21	Juvenile	Male	F 63013
BB 32	19	4/21	Adult	Male	F 63014
BB 33	19	4/21	Adult	Female	F 63015
BB 34	19	4/21	Adult	Female	F 63016
BB 35	19	4/21	Juvenile	Male	F 63017

Appendix Table 25 (continued). Neckbanded sharp-tailed grouse near Colstrip.

Neckband Number	Dancing Ground	Date Banded	Age	Sex	Leg Band Number
BB 36	19	4/21	Adult	Male	F 63018
BB 37	19	4/21	Juvenile	Male	F 63019
BB 38	19	4/21	Adult	Female	F 63020
BB 39	19	4/21	Juvenile	Male	F 63021
BB 40	19	4/21	Adult	Female	F 63022
BB 41	19	4/21	Adult	Male	F 63023
BB 42	19	4/21	Adult	Male	F 63024

1/ Dancing ground numbers and locations are from Schwarzkoph 1975.
2/ Bands returned by hunters.